Podcast Transcript

# Interview with Dr. David Schindel, Executive Secretary of the Consortium for the Barcode of Life (CBOL) Project

**Music/Standard Intro:**
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S1 00:02 We're here today with Dr. David Schindel, and welcome. Thank you very much, we're very happy to have you here. You're the Executive Secretary of the Consortium for the Barcode of Life, which is a bit of a mouthful, can you please tell us what that is?

S2 00:18 Sure, and thanks for your interest in this subject. The Consortium for the Barcode of Life (CBOL) is an activity that started in 2004 with support from the Alfred Sloan Foundation of New York. They gave a grant to the Smithsonian in Washington to set up an international initiative on the subject of DNA barcoding. DNA barcoding was a proposal by a scientist in Canada that seems too good to be true. He said that inside the genome of all organisms there is a little stretch of DNA. Very, very short that could be used as a standardized tool for identifying species - that is from telling one species from another. And he got the idea by standing in a supermarket, waiting on the check-out line, looking around, wondering

how many products were there in a supermarket, when there were only 12 digits on the universal product code. The thing we think of as a barcode – well, turned out the supermarket, typical big supermarket has about 40,000 products, and the Universal Product Code has 12 digits, so there's more than enough information in the barcode to tell all those products apart.

S2 01:33 So then he wondered, if we know there's two million species on Earth and maybe another 10 million that haven't been described - how much DNA would it take to tell them apart? And the answer is not very much, so he discovered this stretch of DNA that we call "CO1" - Cytochrome C Oxidase 1, it's in all of our cells. And hard to believe it actually works, for example, all human beings have an identical or nearly identical DNA sequence for this little bit of DNA, 650 letters A, G, C and T. And our nearest relative chimpanzee is about 5% different. So it unambiguously separates humans and chimps by their DNA and it works for almost all animals, and we're doing the same with plants and fungi. So the Barcode of Life is a way of identifying species with a short standardized DNA sequence.

S1 02:36 It sounds like a very interesting project, and one that's easy to get lost and down in the weeds, and as well. And what is hoped to be done with the DNA

once this is all collected?

S2 02:49 Well, we've already collected DNA from hundreds of thousands of specimens, tens of thousands of different species. And we start by getting well-identified specimens out of museums, zoos, aquaria, ecological field studies, where we note species' name, and then we get the DNA barcode from that. So relatively straight forward molecular-biology process done in most college laboratories, and we put that into GenBank. GenBank is the National Institute of Health's DNA Sequence Archive in Bethesda, Maryland. And we store it there as a public resource, so that means that if you want to identify an unknown piece of tissue, let say fish - fish is a good example, this has been a lot of times. If you're not sure that the fish you're buying in the fish market or the sushi restaurant is actually what it's labeled. You can get the DNA barcode from that, copy and paste the sequence into the GenBank website, and it will compare it to everything in the library and tell you what it's most closely related to. That's one example of the practical aspect of it, but it's also being used by scientist to study the taxonomy in evolution of species. And it's also been very useful in discovering new species that we overlooked.

S1 04:16 And could this DNA ever be used perhaps to end or

help fight against animal trafficking, or something like that?

S2 04:27 That's the project that we're working on now, the Sloan Foundation supported us for eight years and that was mostly to build the community of barcoders. But it was mostly academic researchers interested in evolutionary biology and taxonomy. We were approached a few months ago by Google in California that was interested in barcoding for the social impact it could have, and the area they were most interested in was just the one you mentioned. Could you use an identification tool like DNA barcoding to stop illegal poaching and trafficking of endanger species? So they gave this Smithsonian grant for $3 million - came to this, the Consortium for the Barcode of Life. And we're now working to construct a reference library for the endangered species on Earth and their close relatives to be able to identify things that are being smuggled or poached that are hard to identify.

S2 05:25 So if a lion's head or a gorilla trophy might be easy to identify, but a lot of skins are tanned, a lot of products are turned into clothing product like alligator purses. Rare birds are smuggled as eggs; orchids that are rare are smuggled as root cutlets or little pieces of a leaf that can be grown. And bushmeat is an important thing, illegally poached

animals like primates that are hunted in tropical forests that butchered, smoked and packaged for shipment overseas. All of these things are reducing the natural populations of rare species and really increasing their risk of extinction. So enforcement agencies around the world are looking for new and better ways to identify these specimens that are hard to identify.

S2 06:24 The things that might be overlooked or can't be identified with any confidence, the DNA is the final tool - the best tool for identifying what the specimens are. And if we think back 30 years, DNA wasn't used for crime investigation very much at all, but we went through a period where the law enforcement community develops standards, laboratories and the database. We call it CODIS, where the DNA from convicted criminals and in some cases people who've been arrested for crimes is there as a giant look-up table. So when you see somebody take a chick swab on a crime scene program. It's the same thing as the barcode - not quite but close enough, the DNA is being compared to a giant reference library to look for a match.

S1 07:20 It's very interesting, and how is the country of Nigeria or the government of Nigeria is getting involved with this project?

S2 07:26 When we designed the project in collaboration with Google, we decided that at this early stage, we should focus on six developing countries. Six partner countries that were high in their biodiversity, seemed genuinely interested in cracking down on illegal trafficking and poaching. And had some capabilities in biotechnology that had a basic understanding of barcoding - they had some researchers who were experienced in it. And we felt that with Google Support, we could add training and help them develop their capabilities to do barcoding, and Nigeria was one of those six countries. I spent the last few days in Nigeria visiting research institutions, we held a planning meeting.

S2 08:14 And I come away very impressed and NESREA is the National Environmental Standards and Regulations Enforcement Agency, they're very enthusiastic about the project. They're going to be identifying an academic lab or perhaps a government lab that will be developed into their forensics lab. And they think that this is the kind of tool that will really help them stop illegal trafficking. Not just the poaching of animals and plants that are done in Nigeria, but the trafficking of illegally harvested endangered species from other countries through Nigeria. So it's a serious problem, the Nigerian officials are taking it very seriously. And there was a lot of enthusiasm for the academic community and the enforcement

community to get together to see if they can develop this tool and demonstrate its value within two years.

S1 09:11 That's wonderful on their involvement, and I'm curious because I've also heard something about another treaty perhaps, maybe it is called CITES. Is there any link between this program, this DNA and the trafficking and CITES?

S2 09:30 Yeah. CITES is the international treaty - the Convention on International Trade in Endangered Species of Wild Fauna and Flora. It's one of the UN conventions, like the Convention on Biological Diversity or there's one on migratory species. CITES is a very important treaty in that, it's the place where about 180 parties/countries that have ratified and joined the convention - where they get together to agree on what are the most endangered species. Species are endangered from a number of causes: climate change, loss of habitat - CITES focuses on the ones that are threatened by international trade. And that means things like horticultural specimens, fancy plants that are being poached and shipped to gardening centers; it includes the pet trade, exotic lizards, spiders, colored birds.

S2 10:31 But it also includes lumber species, exotic hardwood lumbers that are endangered because of illegal trade internationally. So it's not just the big furry things,

like lions, and tigers, and elephants, and rhinos - there are thousands of species that are endangered by international trade. So these species that are CITES listed, then are protected by national law, that's the nature of international treaty. The parties to the treaty agreed to pass national legislation that will implement the convention. In the United States, it's the Endangered Species Act, and it's implemented by the Fish and Wildlife Service, NOAA the National Oceanic and Atmospheric Administration is in charge of the marine mammals. And the US Department of Agriculture enforces the Endangered Species Act for plants.

S2 11:27 There's an Endangered Species Act in Nigeria, just as there for almost all of the other CITES signatories, and is the key to enforcement. We can list species that are endangered, but what do we do about it? The Endangered Species Act in Nigeria and the US gives authorities the right to find and even imprison people who are caught with CITES listed species without the permits that gives them permission to own them and move them across borders. There are some cases where you can move specimens that are endangered across borders. For example, for certain research and education purposes, but you can't do it for commercial trade.

S1 12:15 It's very interesting. Thank you very much for your

time. I think it's safe to say that I may not look at another leather handbag again without wondering where the hide really comes from, which is a good thing to get us all thinking about it actually. So Dr. Schindel, I really appreciate your time, thank you again for coming and good luck with the program.

S2 12:34 Thanks for your interest and for this opportunity to talk about the project.

**Music/Outro/Standard**

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